



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/711,482	09/21/2004	Peter J. Geiss	BUR920040004US1	5481
24241 7590 07/02/2007 IBM MICROELECTRONICS INTELLECTUAL PROPERTY LAW 1000 RIVER STREET 972 E ESSEX JUNCTION, VT 05452			EXAMINER BUDD, PAUL A	
			ART UNIT 2815	PAPER NUMBER
			MAIL DATE 07/02/2007	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/711,482

Applicant(s)

GEISS ET AL.

Examiner

Paul A. Budd

Art Unit

2815

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 May 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15, 21 and 22 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-15 and 21 is/are rejected.
- 7) ☒ Claim(s) 22 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 September 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. Claims **1-15** and **21-22** are pending in the instant application. Claims **1, 5-7, 9-11** and **13** are amended and no new matter is entered. The amendments to the specification are accepted and no new matter is entered.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claim **21** is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Claim **1** recites the limitation "at least one of said collector and emitter regions including a first region doped with an impurity having a first concentration and a second region doped with said impurity having a second concentration". Claim **21** recites the limitation "The heterojunction bipolar transistor of claim 1, wherein said first region comprises a first in-situ doped polysilicon layer and said second region comprises a second in-situ doped polysilicon layer". While the applicant has enabled an emitter layer formed of polysilicon the applicant has not enabled forming the collector region from polysilicon.

The formation of the collector regions is enabled in paragraphs 27-29 and no enablement is found for polysilicon collector layers.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1-15 are rejected under 35 U.S.C. 102(e) as being anticipated by Toyoda et al. (US Patent 7,135,721).

Regarding claim 1, Toyoda teaches a heterojunction bipolar transistor comprising:

a semiconductor substrate [FIG. 2, 10, col 6, lines 40-41] of a first conductivity type [p] including a collector region [FIG. 2, 11; col 6, lines 41-45];

a base region [FIG. 2, 12 & 13; col 6, lines 45-68] formed on said substrate [10] comprising a non-dopant [col 6, lines 42-47, "SiGeC"];

an emitter region [FIG. 2; 15 & 14a; col 7, lines 5-22] formed over said base region [12, 13]; and

at least one of said collector, and emitter regions [15, 14a] including a first region [14a] doped with an impurity [column 7, lines 9-17, "arsenic or (phosphorus)", "this n-type

Art Unit: 2815

impurity is diffused into the Si Cap layer by heat treatment to form an emitter region 14a"] having a first concentration [less than $1 \times 10^{20}/\text{cm}^3$ Because of "Ficks Law" and thermodynamics the layer 14a MUST inherently have a concentration lower than its source of dopant=layer 15)] and a second region [15] doped with said impurity ["arsenic or (phosphorus)"] having a second concentration [$1 \times 10^{20}/\text{cm}^3$]; and

an emitter-base junction region or a collector-base junction region formed by out-diffusion [column 7, lines 14-17, "this n-type impurity is diffused into the Si Cap layer by heat treatment to form an emitter region 14a"] of said impurity from at least one of said first and second regions.

While Toyoda does teach the process required by the limitation "an emitter-base junction region or a collector-base junction region formed by out-diffusion of said impurity from at least one of said first and second regions" this limitation is not limiting because it is subject to the product by process policy stated below.

The limitation "an emitter-base junction region or a collector-base junction region formed by out-diffusion of said impurity from at least one of said first and second regions" is drawn to a process by which the product is made. Note that a "product by process" claim is directed to the product per se, no matter how actually made, In re Hirao, 190 USPQ 15 at 17 (footnote 3). See also In re Brown, 173 USPQ 685; In re Luck, 177 USPQ 523; In re Fessmann, 180 USPQ 324; In re Avery, 186 USPQ 161; In re Marosi et al., 218 USPQ 289; and particularly In re Thorpe, 227 USPQ 964, all of which make it clear that it is the patentability of the final product per se which must be determined in a "product by process" claim, and not the patentability of the process, and

that an old or obvious product produced by a new method is not patentable as a product, whether claimed in "product by process" claims or not. Note that applicant has the burden of proof in such cases, as the above case law makes clear.

Additionally Because of "Ficks Law" and thermodynamics the layer 14a MUST inherently have a concentration lower than its source of dopant=layer 15)).

The "emitter-base junction region" claimed by the applicant is interpreted by the Office to be claiming an emitter-base junction formed by out-diffusion. This "region" is the space where the "p" and "n" dopant concentrations are equal and form a depletion region devoid of free charge carriers. If the applicant's intention was/is to claim a third emitter layer that is separate and distinct from the other two emitter layers then the applicant is advised to describe the third layer in structural language that unambiguously claims a third emitter layer. Claim language that physically differentiates the emitter regions/layers such as an "interface" between regions could be used since one layer without an interface may sometimes be interpreted as multiple layers depending on the physical characteristics of the reference and the claimed structure.

Regarding claim 2, Toyoda teaches the heterojunction bipolar transistor of claim 1, wherein said base region comprises SiGe [col 6, lines 42-47, "SiGeC"].

Regarding claim 3, Toyoda teaches the heterojunction bipolar transistor of claim 1, wherein said first concentration is less than said second concentration [col. 6, lines 57-60].

Regarding claim 4, Toyoda teaches the heterojunction bipolar transistor of claim 1, wherein said emitter region [FIG. 2; 14a, 15] comprises said first [14a] region doped with a dopant [col 7, line 11; arsenic or phosphorus] having a first concentration [less than 1×10^{20}] and said second region [15] doped with said dopant [col 7, line 11; arsenic or phosphorus] having a second concentration [1×10^{20}] greater than said first concentration [(somewhat less than 1×10^{20} , col 7 lines 14-16, "This n-type impurity is diffused into the Si cap layer 14 by heat treatment, to form emitter region 14a in the Si cap layer 14"; Because of "Ficks Law" and thermodynamics the layer 14a MUST inherently have a concentration lower than its source of dopant=layer 15)].

Regarding claim 5, Toyoda teaches the heterojunction bipolar transistor of claim 4, wherein said first region [14a] is formed closer [See FIG. 2] to said emitter-base junction region [as above] than said second region [15].

Regarding claim 6, Toyoda teaches the heterojunction bipolar transistor of claim 1, wherein said base region [FIG. 2; 12, 13] comprises a first base region [13] doped with said non-dopant [carbon] having a first concentration [col 6, lines 46-47, "low C content"] and a second base region [12] doped with said non-dopant [carbon] having a second base concentration [col 6, lines 44-45, "high C content"] greater than said first base concentration [col. 6, lines 57-60].

Art Unit: 2815

Regarding claim 7, Toyoda teaches the heterojunction bipolar transistor of claim 6, wherein said first region [13] is formed closer [see FIG. 2] to said emitter-base junction region [as above] than said second base region [12].

Regarding claim 8, Toyoda teaches the heterojunction bipolar transistor of claim 1, wherein an impurity concentration profile of said first or second regions comprises a step profile [See FIG.s 3A, 4A, 4B, 5A, 6A, 7A] or a graded profile. [These figures show both abrupt and graded profiles for at least one layer]

Regarding claim 9, Toyoda teaches a heterojunction bipolar transistor comprising:

- a semiconductor substrate [FIG. 2, 10, col 6, lines 40-41] of a first conductivity type [p] including a collector region [FIG. 2, 11; col 6, lines 41-45];

- a base region [FIG. 2, 12 & 13; col 6, lines 45-68] formed on said substrate [10] including a first base region [13] doped with a non-dopant [carbon] having a first concentration [col 6, lines 46-47, "low C content"] and a second base region [12] doped with said non-dopant [carbon] having a second concentration [col 6, lines 44-45, "high C content"];

- an emitter region [FIG. 2; 14a, 15] formed over said base region [12, 13] including a first emitter layer *in-situ doped* [14a] with a dopant [col 7, line 11; arsenic or phosphorus] having a first concentration [as above, less than 1×10^{20} by thermal

Art Unit: 2815

diffusion] and a second emitter layer *in-situ doped* [15] with said dopant [arsenic or phosphorus] having a second concentration [1×10^{20}],

an emitter-base junction region formed by out-diffusion [column 7, lines 14-17, "this n-type impurity is diffused into the Si Cap layer by heat treatment to form an emitter region 14a"] of said dopant from at least one of said first and second emitter layers.

The limitations "an emitter-base junction region formed by out-diffusion of said dopant from at least one of said first and second emitter layers", "a first emitter layer in-situ doped", and "a second emitter layer in-situ doped" is drawn to a process by which the product is made. Note that a "product by process" claim is directed to the product per se, no matter how actually made, In re Hirao, 190 USPQ 15 at 17 (footnote 3). See also In re Brown, 173 USPQ 685; In re Luck, 177 USPQ 523; In re Fessmann, 180 USPQ 324; In re Avery, 186 USPQ 161; In re Marosi et al., 218 USPQ 289; and particularly In re Thorpe, 227 USPQ 964, all of which make it clear that it is the patentability of the final product per se which must be determined in a "product by process" claim, and not the patentability of the process, and that an old or obvious product produced by a new method is not patentable as a product, whether claimed in "product by process" claims or not. Note that applicant has the burden of proof in such cases, as the above case law makes clear. These product by process limitations add no further structural limitations to claim 9.

As stated previously and restated below simply to reiterate the Offices position; The "emitter-base junction region" claimed by the applicant is interpreted by the Office

Art Unit: 2815

to be claiming the emitter-base junction formed by out-diffusion. This "region" is the interpreted as the space where the "p" and "n" dopant concentrations are equal and form a depletion region devoid of free charge carriers. If the applicant's intention was/is to claim a third emitter layer that is separate and distinct from the other two claimed emitter layers, then the applicant is advised to describe the third layer in structural language that unambiguously claims a third emitter layer.

Regarding claim 10, Toyoda teaches the heterojunction bipolar transistor of claim 9, wherein said base region comprises SiGe [col 6, lines 42-47, "SiGeC"].

Regarding claim 11, Toyoda teaches the heterojunction bipolar transistor of claim 9, wherein said first base region [13] and said first emitter layer [14a] are formed closer to said emitter-base junction region than said second base region [12] and said second emitter layer [15].

Regarding claim 12, Toyoda teaches the heterojunction bipolar transistor of claim 9, wherein said non-dopant comprises carbon [col 6, lines 44-65].

Regarding claim 13, Toyoda teaches the heterojunction bipolar transistor of claim 11, wherein said first carbon concentration is from about $8 \times 10^{18} \text{ cm}^{-3}$ to about $5 \times 10^{19} \text{ cm}^{-3}$, and said second carbon concentration is from about $1.5 \times 10^{19} \text{ cm}^{-3}$ to about $7 \times 10^{19} \text{ cm}^{-3}$. This is evidenced by Toyoda's: 1) Claim 1, column 11, lines 20-23 where the

applicants ranges are taught by the equation $\text{Si}_{1-x-y}\text{Ge}_x\text{C}_y$ ($0 < x < 1$, $0 \leq y < 1$), 2) Toyoda's FIG. 1 where a continuum of x and y values are taught, 3) In column 4, lines 6-8, where Toyoda teaches "The carbon content of the portion of the base region adjacent to the emitter region may be 0.01% or more" (0.01% times silicon's density of $5 \times 10^{22} \text{ cm}^{-3}$ equals $5 \times 10^{18} \text{ cm}^{-3}$ which results in anticipating the applicant's claimed range by teaching $5 \times 10^{18} \text{ cm}^{-3}$ or more, 4) teaching on column 6, lines 61-63 that "The C content of at least the boundary portion of the second base region on the side of the emitter region should be less than 0.8%" which results in 0.8% times $5 \times 10^{22} \text{ cm}^{-3}$ equals $4 \times 10^{20} \text{ cm}^{-3}$ which includes the applicant's range where Toyoda teaches a range of greater than $5 \times 10^{18} \text{ cm}^{-3}$ and less than 4×10^{20} for the applicant's second concentration. The applicants claimed ranges are well known in the art as evidenced by Toyoda as well as others such as Sato (US Pat. Pub. 2004/0201461) on page 9, sections 0131, 0133, 0142, and figures 2, 3, 5, and 6. The applicant's choice of concentrations are an optimization of known ranges in the art and are dependent on the Boron concentration chosen for the base layer as evidenced by Toyoda or as Sato also points out.

Regarding claim 14, Toyoda teaches the heterojunction bipolar transistor of claim 9, wherein said dopant comprises arsenic [col 7, line 11; arsenic or phosphorus].

Regarding claim 15, Toyoda teaches the heterojunction bipolar transistor of claim 14, wherein said first arsenic concentration is from about $5 \times 10^{19} \text{ cm}^{-3}$ to about $3 \times 10^{20} \text{ cm}^{-3}$ [(somewhat less than 1×10^{20} , col 7 lines 14-16, This n-type impurity is diffused into

Art Unit: 2815

the Si cap layer 14 by heat treatment, to form emitter region 14a in the Si cap layer 14"; Because of "Ficks Law" and thermodynamics the layer 14a MUST have a concentration lower than its source of dopant=layer 15)], and said second arsenic concentration is from about $1 \times 10^{20} \text{ cm}^{-3}$ to about $7 \times 10^{20} \text{ cm}^{-3}$ [col 7, line 14, " 1×10^{20} "].

4. Claims 1-5, and 8 are rejected under 35 U.S.C. 102(b) as being anticipated by Endo et al. (US Patent 5,177,583).

Regarding claim 1, Endo teaches a heterojunction bipolar transistor comprising:

- a semiconductor substrate [FIG. 1, 101, column 11, lines 45-47] of a first conductivity type [p] including a collector region [FIG. 1; 102, 103, 104; column 11, lines 49-55];

- a base region [FIG. 1; 105, 106; column 11, lines 55-61] formed on said substrate [101] comprising a non-dopant [FIG. 1, 105, 106; column 11, lines 55-61; SiGe, either silicon or **germanium**];

- an emitter region [FIG. 1; 107, 108; column 11, lines 62-68] formed over said base region [105, 106]; and

- at least one of said collector [103 (5×10^{16}), 104 (4×10^{17}); col 11 lns 50-54], and emitter [107 (5×10^{17}), 108 (1×10^{20}); col 11, lns 62-68] regions including a first region doped with an impurity having a first concentration [shown in parenthesis above] and a second region doped with said impurity having a second concentration [shown in parenthesis above].

an emitter-base junction region or a collector-base junction region formed by out-diffusion of said impurity from at least one of said first and second regions.

The limitation "an emitter-base junction region or a collector-base junction region formed by out-diffusion of said impurity from at least one of said first and second regions" is drawn to a process by which the product is made. Note that a "product by process" claim is directed to the product per se, no matter how actually made, In re Hirao, 190 USPQ 15 at 17 (footnote 3). See also In re Brown, 173 USPQ 685; In re Luck, 177 USPQ 523; In re Fessmann, 180 USPQ 324; In re Avery, 186 USPQ 161; In re Marosi et al., 218 USPQ 289; and particularly In re Thorpe, 227 USPQ 964, all of which make it clear that it is the patentability of the final product per se which must be determined in a "product by process" claim, and not the patentability of the process, and that an old or obvious product produced by a new method is not patentable as a product, whether claimed in "product by process" claims or not. Note that applicant has the burden of proof in such cases, as the above case law makes clear.

As stated above, the "emitter-base junction region" claimed by the applicant is interpreted by the Office to be claiming an emitter-base junction formed by out-diffusion. This "region" is the space where the "p" and "n" dopant concentrations are equal and form a depletion region devoid of free charge carriers. If the applicant's intention was/is to claim a third emitter layer that is separate and distinct from the other two emitter layers then the applicant is advised to describe the third layer in structural language that unambiguously claims a third emitter layer and does not rely on product by process terminology.

Regarding claim 2, Endo teaches the heterojunction bipolar transistor of claim 1, wherein said base region comprises SiGe [FIG. 1, 105, 106; column 11, lines 55-61].

Regarding claim 3, Endo teaches the heterojunction bipolar transistor of claim 1, wherein said first concentration is less than said second concentration [bases 105 (5×10^{17}), 106 (1×10^{19})].

Regarding claim 4, Endo teaches the heterojunction bipolar transistor of claim 1, wherein said emitter region [FIG. 1; 107 (5×10^{17}), 108 (1×10^{20})] comprises said first [107 (5×10^{17})] region doped with a dopant [Sb, Antimony] having a first concentration [5×10^{17}] and said second region [108 (1×10^{20})] doped with said dopant [Sb, Antimony] having a second concentration [1×10^{20}] greater than said first concentration [5×10^{17}].

Regarding claim 5, Endo teaches the heterojunction bipolar transistor of claim 4, wherein said first region [107] is formed closer [See FIG. 1] to said emitter-base junction region than said second region [108].

Regarding claim 8, Endo teaches the heterojunction bipolar transistor of claim 1, wherein an impurity concentration profile of said first or second regions comprises a step profile [See FIG. 2, step profile] or a graded profile.

Allowable Subject Matter

5. Claim 22 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

6. Applicant's arguments filed 1 June 2007 regarding the Toyoda rejections have been fully considered but they are not persuasive. The applicant's arguments are not commensurate with the applicant's claim language. As stated above, the "emitter-base junction region" claimed by the applicant is interpreted by the Office to be claiming the emitter-base junction formed by out-diffusion. This "region" is interpreted as the space where the "p" and "n" dopant concentrations are equal and form a depletion region devoid of free charge carriers. The Office agrees that there are differences between the Toyoda reference and the applicant's invention. The Office agrees that the applicant's region 34 seen in the applicant's figure 1 is equivalent to Toyoda's region 14a seen in Toyoda's figure 2. Toyoda does not teach three emitter layers and the applicant is not claiming three physically distinct emitter layers/regions. The "emitter-base junction region" is a label that has only been structurally defined by product by process language and has been interpreted by the Office to be claiming an emitter base junction. Toyoda has two emitter layers separated by one interface as seen in Toyoda's figure 2. The

applicant has three emitter layers with two interfaces. The applicant can structurally distinguish over the Toyoda reference but has not yet done so as explained.

Applicant's arguments filed 1 June 2007 regarding the Endo rejections have been fully considered but they are not persuasive. The applicant states "Both Endo and Sadovnikov are silent on a base region which includes a non-dopant such as carbon. Endo and Sadovnikov only disclose a dopant (e.g. boron) in the base region (Endo: see Fig. 1 and column 11, lines 55-61; Sadovnikov: see Fig. 3 and column 2, lines 35-46)". Contrary to the applicant's statement, Endo shows directly within Fig. 1 and Fig. 3 that the base regions 105 and 106 contain 10% germanium which is a **non-dopant**. Column 11, lines 55-61 of Endo teaches Boron as an impurity/dopant in the base AND also discloses the composition of the base as $\text{Si}_{0.9}\text{Ge}_{0.1}$. If it is not already clear the Office wishes to make it clear that by teaching $\text{Si}_{0.9}\text{Ge}_{0.1}$ Endo anticipates, "a base region formed on said substrate comprising a non-dopant". The applicant teaches on page 5 para 22 of their application that, "Non-dopant elements comprise, for example, Carbon (C) and Germanium (Ge)". Is the Office missing something in the applicant's arguments regarding Endo?

Applicant's arguments filed 1 June 2007 regarding the Sadovnikov rejections have been fully considered but they are not persuasive. The applicant states "Endo and Sadovnikov only disclose a dopant (e.g. boron) in the base region" however on column 2 lines 35-46 teaches "epitaxial SiGe layer" for both base layers. If it is not already clear the Office wishes to make it clear that by teaching SiGe Sadovnikov anticipates, "a base region formed on said substrate comprising a non-dopant". The Office is very confused

by the applicant's arguments especially in light of the applicant's teachings that germanium is a non-dopant. Nevertheless, the Sadovnikov reference is not used to reject amended claim 1 because it does not teach "at least one of said *collector*, and *emitter* regions including a *first* region doped with an impurity having a *first concentration* and a *second* region doped with said impurity having a *second concentration*" but *not* for the reasons that the applicant argues.

Conclusion

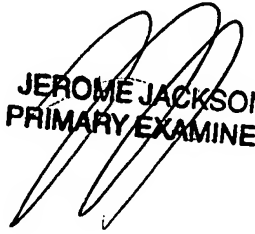
7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Paul A. Budd whose telephone number 571-272-8796. The examiner can normally be reached on Monday to Friday 8:30 to 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ken Parker can be reached on 571-272-2298. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

PAB


JEROME JACKSON
PRIMARY EXAMINER